

What is claimed is:

- 1 1. An antenna interface circuit to provide an interface between a packaged
2 microelectronic device and an antenna, comprising:
3 at least one of the following on one or more substrates: metallization forming a
4 power amplifier impedance transformer, metallization forming a low noise amplifier
5 input matching circuit, and metallization forming a duplexer to couple an external
6 transmitter and an external receiver to a common antenna; and
7 at least one electrical terminal to couple said antenna interface circuit to a
8 microelectronic device package.
- 1 2. The antenna interface circuit of claim 1, wherein:
2 said at least one electrical terminal is for direct connection to one or more
3 corresponding terminals on a side of the microelectronic device package that has a
4 microelectronic die mounted thereto.
- 1 3. The antenna interface circuit of claim 1, further comprising:
2 at least one electrical terminal to couple said antenna interface circuit to an
3 external antenna.
- 1 4. The antenna interface circuit of claim 1, further comprising:
2 metallization forming an integrated antenna.
- 1 5. The antenna interface circuit of claim 1, wherein:
2 said antenna interface circuit includes multiple metallization layers.
- 1 6. The antenna interface circuit of claim 5, comprising:
2 metallization forming a power amplifier impedance transformer on one
3 metallization layer and metallization forming a low noise amplifier input matching
4 circuit on another, different metallization layer.

- 1 7. The antenna interface circuit of claim 5, wherein:
2 at least one of said multiple metallization layers includes a ground plane.
- 1 8. The antenna interface circuit of claim 1, wherein:
2 said antenna interface circuit is flexible.
- 1 9. The antenna interface circuit of claim 1, wherein:
2 said at least one electrical terminal includes a ball grid array (BGA).
- 1 10. The antenna interface circuit of claim 1, further comprising:
2 metallization forming at least one radio frequency choke to couple a transistor
3 within the packaged microelectronic device to a power supply.
- 1 11. An antenna interface circuit to provide an interface between a packaged
2 microelectronic device and an antenna, comprising:
3 first metallization forming a power amplifier impedance transformer, second
4 metallization forming a low noise amplifier input matching circuit, and third
5 metallization forming a duplexer to couple an external transmitter and an external
6 receiver to a common antenna, said first metallization being connected to said third
7 metallization and said second metallization being connected to said third metallization,
8 wherein said first, second, and third metallizations are on one or more substrates;
9 at least one electrical terminal to couple said first metallization to a
10 microelectronic device; and
11 at least one electrical terminal to couple said second metallization to the
12 microelectronic device.
- 1 12. The antenna interface circuit of claim 11, further comprising:
2 at least one electrical terminal to connect said third metallization to an external
3 antenna.

1 13. The antenna interface circuit of claim 11, further comprising:
2 fourth metallization, connected to said third metallization, forming an integrated
3 antenna.

1 14. The antenna interface circuit of claim 11, wherein:
2 said antenna interface circuit includes multiple metallization layers, wherein
3 said first metallization is located on a first metallization layer and said second
4 metallization is located on a second, different metallization layer.

1 15. The antenna interface circuit of claim 14, further comprising:
2 a ground plane located on a third metallization layer, said third metallization
3 layer being located between said first metallization layer and said second metallization
4 layer.

1 16. The antenna interface circuit of claim 11, wherein:
2 said antenna interface circuit is flexible.

1 17. A system comprising:
2 a microelectronic device including: (a) a package having an upper side and a
3 lower side, and (b) at least one microelectronic die having wireless circuitry therein
4 mounted on said upper side of said package, wherein said lower side of said package
5 includes a plurality of terminals to couple said package to a circuit board and said upper
6 side of said package includes at least one terminal to provide communication with an
7 external antenna; and
8 an antenna interface circuit to provide an interface between said microelectronic
9 device and an antenna, said antenna interface circuit having at least one terminal that is
10 connected to said at least one terminal on said upper side of said package.

1 18. The system of claim 17, wherein:
2 said antenna interface circuit includes power amplifier impedance transformer
3 circuitry.

1 19. The system of claim 17, wherein:
2 said antenna interface circuit includes low noise amplifier input matching
3 circuitry.

4 20. The system of claim 17, wherein:
5 said antenna interface circuit includes duplexer circuitry to allow a wireless
6 transmitter and a wireless receiver within said microelectronic device to share a
7 common antenna.

1 21. The system of claim 17, wherein:
2 said antenna interface circuit includes power amplifier impedance transformer
3 circuitry, low noise amplifier input matching circuitry, and duplexer circuitry to allow a
4 wireless transmitter and a wireless receiver within said microelectronic device to share
5 a common antenna.

1 22. The system of claim 17, wherein:
2 said antenna interface circuit includes multiple metallization layers.

1 23. The system of claim 22, wherein:
2 said antenna interface circuit includes power amplifier impedance transformer
3 circuitry on a first metallization layer and low noise amplifier input matching circuitry
4 on a second metallization layer, wherein said second metallization layer is different
5 from said first metallization layer.

1 24. The system of claim 17, wherein:
2 said antenna interface circuit includes at least one antenna integrated therein.

1 25. The system of claim 17, wherein:
2 said antenna interface circuit is coupled to an external antenna.

1 26. The system of claim 17, wherein:
2 said at least one microelectronic die is mounted on said upper side of said
3 package using flip chip techniques.

1 27. The system of claim 17, wherein:
2 said plurality of terminals on said lower side of said package includes at least
3 one of: a ball grid array (BGA), a pin grid array (PGA), and a land grid array (LGA).

1 28. The system of claim 17, wherein:
2 said antenna interface circuit is flexible.

1 29. A system comprising:
2 a patch antenna; and
3 an antenna interface circuit to provide an interface between a microelectronic
4 device and said patch antenna, said antenna interface circuit including:
5 first metallization forming a power amplifier impedance transformer,
6 second metallization forming a low noise amplifier input matching circuit, and
7 third metallization forming a duplexer to couple an external transmitter and an
8 external receiver to said patch antenna, said first metallization being connected
9 to said third metallization and said second metallization being connected to said
10 third metallization, wherein said first, second, and third metallizations are on
11 one or more substrates;
12 at least one electrical terminal to couple said first metallization to a
13 microelectronic device; and
14 at least one electrical terminal to couple said second metallization to the
15 microelectronic device.

1 30. The system of claim 29, wherein:
2 said antenna interface circuit includes multiple metallization layers, wherein
3 said first metallization is located on a first metallization layer and said second
4 metallization is located on a second, different metallization layer.

1 31. The system of claim 30, further comprising:
2 a ground plane located on a third metallization layer of said antenna interface
3 circuit, said third metallization layer being located between said first metallization layer
4 and said second metallization layer.

1 32. The system of claim 29, wherein:
2 said antenna interface circuit is flexible.

1 33. A microelectronic device comprising:
2 a package having an upper side and a lower side; and
3 at least one microelectronic die having wireless circuitry therein mounted to
4 said upper side of said package;
5 wherein said lower side of said package includes a plurality of terminals to
6 couple said package to a circuit board and said upper side of said package includes at
7 least one terminal to couple said microelectronic device to an external antenna.

1 34. The microelectronic device of claim 33, wherein:
2 said at least one microelectronic die includes a die having both digital
3 processing circuitry and wireless transceiver circuitry located therein.

1 35. The microelectronic device of claim 33, wherein:
2 said at least one microelectronic die is mounted to said upper side of said
3 package using flip chip techniques.

1 36. The microelectronic device of claim 33, wherein:
2 said package includes power amplifier impedance transformer circuitry.

1 37. The microelectronic device of claim 36, wherein:
2 said package includes low noise amplifier input matching circuitry.

1 38. The microelectronic device of claim 37, wherein:
2 said package includes duplexer circuitry to allow a wireless transmitter and a
3 wireless receiver within said microelectronic device to share a common external
4 antenna.

1 39. The microelectronic device of claim 33, wherein:
2 said at least one terminal on said upper side of said package includes at least
3 one terminal to connect said microelectronic device to an external power amplifier
4 impedance transformer.

1 40. The microelectronic device of claim 39, wherein:
2 said at least one terminal on said upper side of said package includes at least
3 one terminal to connect said microelectronic device to an external low noise amplifier
4 input matching circuit.

1 41. A microelectronic device comprising:
2 a package having an upper side and a lower side;
3 at least one microelectronic die having wireless circuitry therein mounted to
4 said upper side of said package, wherein said lower side of said package includes a
5 plurality of terminals to couple said package to a circuit board and said upper side of
6 said package includes at least one terminal to couple said microelectronic device to an
7 external antenna; and
8 an antenna circuit coupled to said at least one terminal on said upper side of said
9 package, said antenna circuit including at least one microstrip antenna element.

1 42. The microelectronic device of claim 41, wherein:
2 said at least one microstrip antenna element includes a patch element.

1 43. The microelectronic device of claim 41, wherein:
2 said antenna circuit is flexible.